

DESCRIPTION OF FIVE NEW SPECIES OF TABANIDAE (DIPTERA) FROM  
COSTA RICA AND REVISED KEYS TO SPECIES FOR THE GENERA  
*FIDENA* WALKER, *SCIONE* WALKER, AND *CHRYSOPS* MEIGEN  
IN COSTA RICA

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*Abstract.*—Five new species of Tabanidae from Costa Rica in four genera are described and differentiated from related species in their respective genera occurring in Costa Rica: *Fidena* (*Fidena*) *griseithorax* Burger, new species, *Scione albopilosus* Burger, new species, *Acanthocera* (*Polistimima*) *vespiformis* Burger, new species, *Chrysops alajuelensis* Burger, new species, and *Chrysops costaricensis* Burger, new species. The immature stages of *Acanthocera* (*Polistimima*) *vespiformis* also are described, the first representative of the genus *Acanthocera* Macquart for which the immature stages have been found. Revised keys to the species of *Fidena* Walker, *Scione* Walker, and *Chrysops* Meigen occurring in Costa Rica are presented.

*Key Words:* Neotropical, keys, Tabanidae, Costa Rica, new species

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Examination of the Tabanidae in the collection of the Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica, and selected specimens in the Florida State Collection of Arthropods (FSCA) and the Cornell University Insect Collection (CUIC) revealed five undescribed species from Costa Rica, including a striking wasp mimic in the subgenus *Polistimima* Fairchild, genus *Acanthocera* Macquart, the first representative of this genus recorded from Central America. These species are described below, compared with related taxa, and revised keys to species of the genera *Fidena* Walker, *Scione* Walker, and *Chrysops* Meigen occurring in Costa Rica are adapted from Fairchild (1986).

*Fidena* (*Fidena*) *griseithorax* Burger,  
new species  
(Figs. 1-2)

*Diagnosis.*—A large grayish and black species with elongate, conical tomented

face, snow-white beard, gray dusted mesoscutum, blackish and brown legs, uniformly yellowish brown infuscated wings and shining black abdomen with white lateral hair tufts on tergites 2, 5 and 6.

*Female.*—*Head:* Front narrow, height 8.75 times width at base, slightly diverging above, gray tomentose below, slightly darkened toward vertex, bearing dense black hairs, callus absent. Subcallus grayish brown tomentose, protuberant. Frontoclypeus conical, elongate, entirely light gray tomentose and bearing abundant black setae dorsally and laterally, setae especially dense anteriorly. Antenna with scape and pedicel grayish brown, flagellum dark brown. Maxillary palp with apical palpomere dark brown, long and slender, length 8.3 times greatest width, about  $\frac{1}{4}$  length of mouthparts, black setose, except for bare area basally on outer surface. Outer sheath of proboscis broken off and missing, stylets near-

ly twice as long as height of head. Eye densely pale pilose. Beard snow-white.

*Thorax:* Mesoscutum grayish brown medianly, gray laterally, overlain with hoary gray tomentum, bearing black and scattered white hairs. Notopleural lobe light gray tomentose, bearing mostly long black hairs and scattered white hairs. Area above wing base with dense tuft of white and black hairs. Postalar lobe bearing long white and scattered black hairs. Scutellum light brown with some grayish tones medianly, bearing black hairs. Pleuron light brownish gray, bearing dense white hairs dorsally and posteriorly on the mesanepisternum, posterodorsal area of the katapisternum, the mesanepimeron and the anterior katatergite, and black hairs ventrally on the katapisternum, posteriorly on the katatergite, and scattered black hairs intermixed among white hairs on the mesanepisternum below the wing base. *Legs:* Coxae grayish brown, fore coxa white haired on basal 2/3, black haired on apical 1/3, mid and hind coxae black haired. Femora dark brownish black and wholly black haired. Fore tibia and tarsus brown, mostly black haired, with orange hairs ventrally on apical half of fore tibia and ventrally on all tarsomeres, mid tibia and tarsus dark brown, hind tibia and tarsus black, mid- and hind tibiae and tarsi wholly black haired. *Wing:* Pale yellowish brown tinted, costal cell strongly yellowish, vein R<sub>4</sub> without spur, cell r<sub>5</sub> closed and petiolate.

*Abdomen:* Shining black and black pilose, except anterior portion of first segment dark brown, tergites and sternites 2, 5 and 6 with lateral patches of white hairs.

*Length:* 19.2 mm, wing, 16 mm.

*Holotype.*—Female, COSTA RICA: Estación Esquinas, Península de Osa, Provincia Puntarenas, 200 m, August 1993, J. Quesada (INBIOCR1001157720). Deposited in the Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Heredia, Costa Rica.

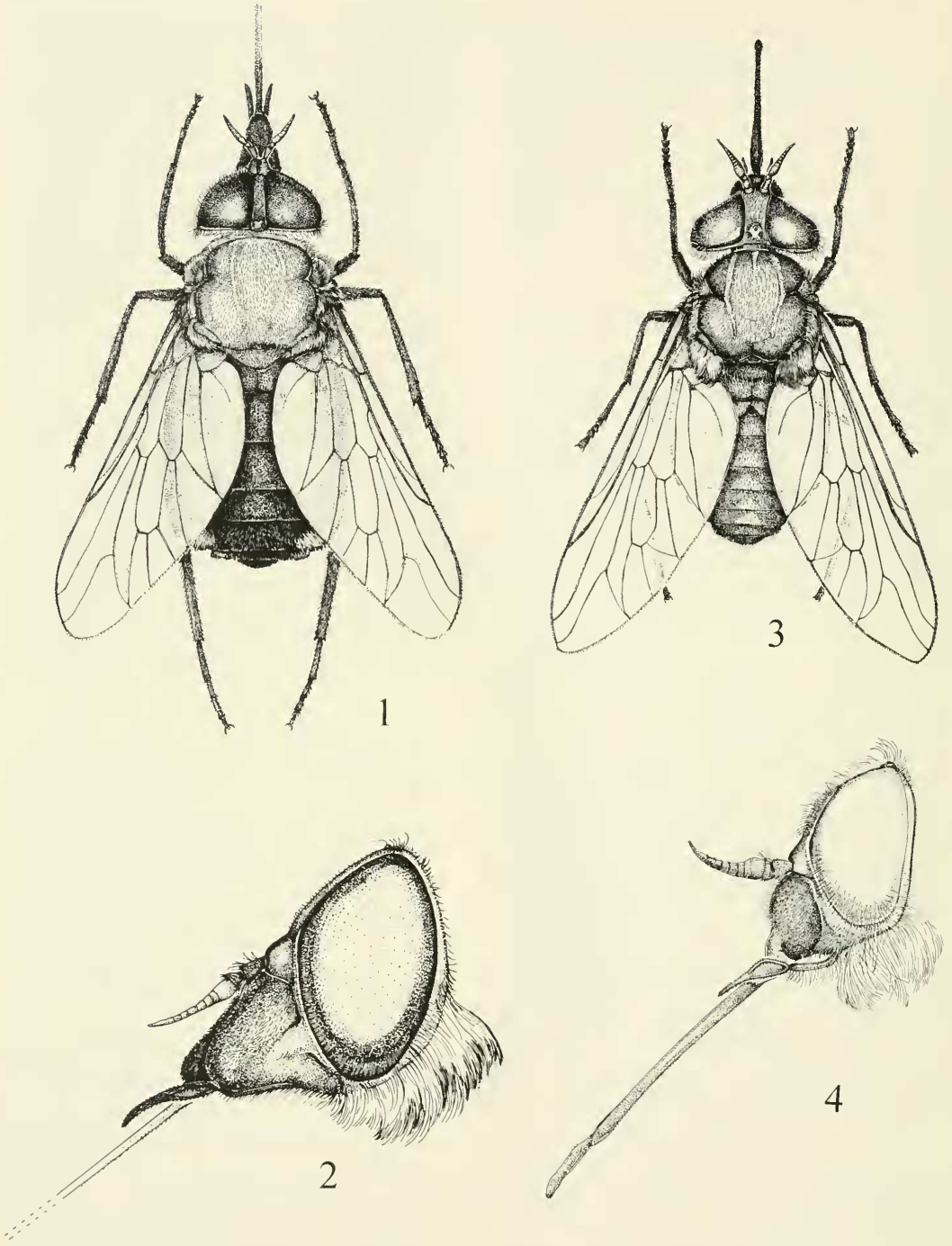
*Etymology.*—This species is named for the hoary grayish tomentum overlying the

gray and brownish color of the mesoscutum.

*Discussion.*—*Fidena griseithorax* shares with *Fidena flavipennis* Kröber in the Costa Rican fauna the narrow front, elongated, tomented face, dark legs, light yellowish brown tinted wings with closed and petiolate cell r<sub>5</sub>, and coloration of the abdomen. *Fidena griseithorax* is easily distinguished from *F. flavipennis* by the white beard, white hairs on the pleuron and the gray tomentum and lateral white hairs on the mesoscutum.

KEY TO SPECIES OF *FIDENA* OCCURRING IN COSTA RICA

1. Legs prominently bicolored, femora black, tibiae and tarsi yellow. Wing black or heavily infuscated basally to ends of cells br and bm . . . . . 2
  - Legs not bicolored, all black, brown or yellowish. Wing rarely heavily infuscated basally, usually evenly tinted . . . . . 3
2. Beard snow white. Sides of mesoscutum with a stripe of white hairs from before transverse suture to posterior margin. Abdomen shiny black, with small tufts of silver-white hairs in middle of tergites 2–5, and at sides of tergites 2, 5 and 6. Sternites 2–4 with white lateral hair tufts; 2 sometimes with white hind marginal band. Face partially denuded and shiny . . . . .
  - . . . . . *erioneroides* (Lutz)
  - Beard black or dark brown. Mesoscutum without contrasting pale hairs. Abdomen shiny black or deep brown, with segments 4 or 5–7 clothed with pale straw yellow, rufous orange, brown or black hairs. Tergite 2 with a patch of white hairs at sides, and sternites 2–4 with small lateral white hair tufts. Rarely tergites 3 and 4 with small white hair tufts . . . . .
    - . . . . . *rhizophora* (Bellardi)
3. Legs pale yellowish brown. Beard, pleuron and abdominal sternites pale yellowish pilose, contrasting with dark dorsal surfaces . . . . .
  - . . . . . *auribarba* (Enderlein)
  - Legs dark brown to black . . . . . 4
4. Abdomen largely black pilose . . . . . 5
  - Abdomen extensively golden pilose . . . . . 7
5. Beard snow-white. Pleuron mostly snow-white haired . . . . . *griseithorax*, n. sp.
  - Beard and pleuron dark brown to black haired . . . . . 6
6. Large species, generally over 18 mm in wing length. Front narrow, more than 4.5 times as high as wide, convergent below. Antenna brownish black. Face conically produced,



Figs. 1-4. Adult females of *Fidena griseithorax* and *Scione albopilosus*. 1, *Fidena griseithorax*, habitus. 2, *F. griseithorax*, lateral view of head. 3, *Scione albopilosus*, habitus. 4, *S. albopilosus*, lateral view of head.

brown, wholly grayish tomentose. Wing uniformly deep yellowish brown tinted. Abdomen dark brown to black, shiny, sparsely black pilose, with tufts of white hairs at sides of tergites 2, 5 and 6 . . . . . *flavipennis* Kröber

Small species, wing length generally less than 12 mm. Front broader, less than 3 times as high as wide, parallel-sided. Antenna bright yellow. Face less produced, yellow, with extensive bare patches laterally. Wing smoky hyaline, the costal cell blackish and end of cell br darkened. Abdomen black, the second segment sparsely white haired above and below, forming a more or less distinct hind marginal band widened at sides above. Tergites 5–7 sparsely white haired and often with median white triangles on tergites 3–4 . . . . . *schildi* (Hine)

- 7. Abdomen with pale yellow integument and all segments beyond black pilose first segment pale golden pilose . . . . . *bicolor* Kröber
- Abdomen with at least some segments beyond first not entirely golden pilose . . . . . 8
- 8. Face relatively short, shorter than front and subcallus, largely shiny. Antenna short and unusually broad, basal flagellomeres distinctly wider than long. Thorax black, generally with prominent white hair tufts on each side of the scutellum, rarely reduced to a few white hairs mixed with black. Abdomen largely bright golden pilose, but with first tergite black pilose, second with golden hairs forming a large median triangle and lateral patches, third with only dorsolateral anterior black patches, remainder wholly golden pilose. Wing yellowish tinted, the basal cells and costal cell darker; cell  $r_5$  coarctate, rarely closed . . . . .  
 . . . . . *trapidoi* Fairchild
- Face relatively long, as long as or longer than front and subcallus, gray tomentose above, shiny laterally. Antenna long and slender, basal flagellomeres at least as long as wide. Thorax without white hair tufts beside scutellum. Abdomen bright golden pilose from third to last segments only, but with a small patch of yellow hairs on posterior lateral borders of second tergite. Wing evenly brownish yellow tinted, cell  $r_5$  closed and petiolate . . . . *howardi* Fairchild

***Scione albopilosus* Burger, new species**  
 (Figs. 3–4)

Diagnosis.—A small, dark blackish brown species with distinct dorsolateral mesoscutal stripes, snow-white haired beard, pleuron and postalar tufts, unicolorous grayish wings and yellowish brown and pale pilose sternum.

Female.—*Head*: Front relatively broad,

twice as high as width at base, slightly diverging below, black brown and black pilose, except lighter brown near eye margins. Subcallus and frontoclypeus concolorous with front. Face relatively short, densely black pilose. Antennal scape and pedicel dark brown, scape bearing long black setae, basal four flagellomeres brown, apical four flagellomeres darker brown. Maxillary palpus dark brown, apical palpomere relatively broad and strongly flattened, strongly narrowed in apical half and sharply pointed, length about three times greatest width. Proboscis relatively long and slender, about 1.5 times height of head. Beard snow-white haired. Eye densely light brown pilose.

*Thorax*: Mesoscutum and scutellum shining dark brown and black pilose except for large tufts of snow-white hairs above wing base and on postalar lobe. Mesoscutum bearing two distinct yellowish gray dorsolateral longitudinal stripes that fade out in posterior third, and a narrower gray median longitudinal stripe extending about half way to scutellum. Pleuron light gray tomentose and white pilose except for scattered black hairs intermixed on mesanepisternum. *Legs*: Fore coxa grayish brown, white pilose basally, black pilose apically. Fore legs dark brown, mid and hind legs black. *Wing*: Wholly grayish hyaline.

*Abdomen*: Tergites 1–2 brown, remaining tergites darker brown to black-brown, tergites 1–5 with a middorsal row of yellowish white haired spots, and pale haired lateral margins, otherwise black pilose. Sternites pale yellowish brown, white pilose.

*Length*: 11.0 mm, wing, 10.7 mm.

Holotype.—Female, COSTA RICA: Provincia Carta, M N Guayabo, Turrialba, 1,100 m, 21 June 1994, coll. J. F. Corrales (INBIOCRI001973469). Deposited in the Instituto Nacional de Biodiversidad (INBio) collection, Santo Domingo, Heredia, Costa Rica.

Etymology.—This species is named for the snow-white haired beard, postalar hair

tufts and pleuron strongly contrasting with the dark brown body.

Discussion.—This species is closest to *Scione costaricana* Szilády, but differs in having much longer and more slender apical palpomere, the snow-white hairs of the head and thorax, dark brown and black haired scutellum, grayish hyaline wing, less distinct middorsal yellowish spots on the abdominal tergites, and the entirely pale yellowish brown and pale pilose sternum.

KEY TO THE SPECIES OF *SCIONE* OCCURRING IN COSTA RICA

- 1. Wing particolored, yellowish and gray, crossveins with obscure dark clouds. Thorax striped with yellowish gray markings. Abdomen yellowish brown to brown, often with some darker color posteriorly, with a middorsal row of yellow to white pilose triangles or spots on the posterior margin of tergites 1-6 (sometimes obscure to absent in abraded specimens) . . . . . *maculipennis* (Schiner)
- Wing hyaline or slightly tinted, not particolored and without clouds on the crossveins . . . . . 2
- 2. Mesoscutum with distinct grayish or yellowish brown dorsolateral stripes extending at least half way to scutellum. Abdomen with contrasting pale hair tufts . . . . . 3
- Mesoscutum without strongly contrasting stripes. Abdomen without contrasting pale hair tufts . . . . . 4
- 3. Beard, pleural hairs and postalar hair tufts snow-white. Sternum pale yellowish brown, white pilose . . . . . *albopilosus* n. sp.
- Beard pale yellow to golden and black haired to mostly black haired. Postalar hair tufts golden. Sternum with the anterior two segments brown, remainder black, black pilose except for white haired hind margins on sternites 2-5 . . . . . *costaricana* Szilády
- 4. Beard, pleuron and sternum white pilose. Apical palpomere extremely short and blunt, only half as long as flagellum . . . *aurilans* (Wiedemann)
- Beard, pleuron and sternum black pilose. Apical palpomere sickle shaped, subequal in length to flagellum . . . . . *fulvosericea* (Kröber)

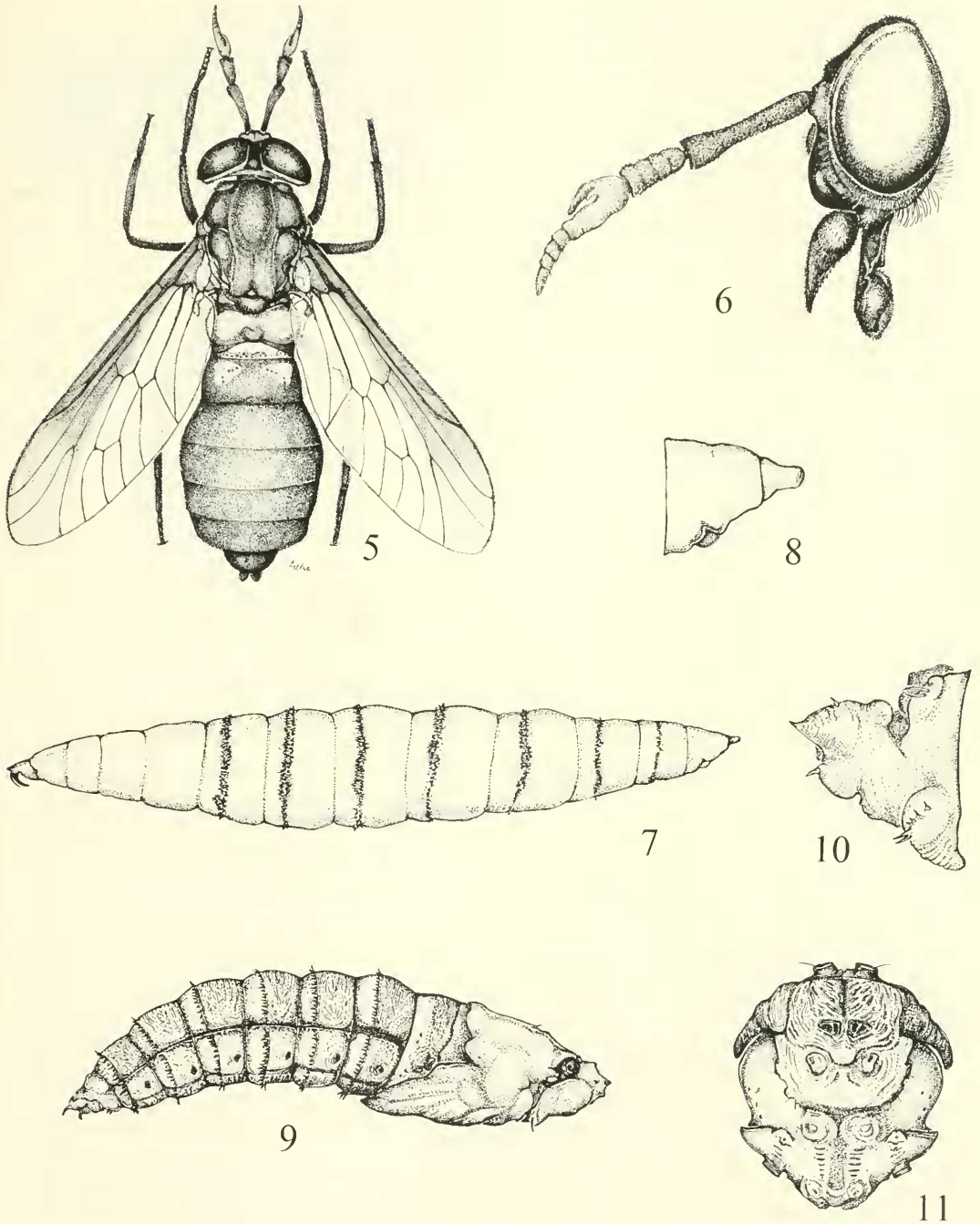
*Acanthocera (Polistimima) vespiformis*  
Burger, new species  
(Figs. 5-11)

Diagnosis.—A large, wasplike blackish brown and black species with greatly elongated scape and pedicel, basal flagellomere

with thumblike dorsal spine, greatly inflated maxillary palpi, wing with anterior third darkened, and abdomen strongly constricted basally.

Female.—*Head*: Front parallel above, slightly divergent below near subcallus, index 1.6, velvety black medianly, blackish brown laterally, bearing dense, very short bristly black hairs, except on callus and near eye margins, callus brown, triangular, rather poorly defined, widely separated from eye margins, with a narrow dorsal extension half way to vertex. Vertex distinctly sunken below level of ocular margin, ocular margin with short orange and black hairs. Subcallus brownish black, with long yellowish and dark hairs dorsolaterally below junction with front. Frontoclypeus shining dark brown, strongly swollen. Gena blackish gray tomentose. Antenna extremely long, equal in length to mesoscutum and scutellum combined, scape and pedicel shining dark brown, flagellum reddish brown, scape cylindrical, greatly elongate, twice length of pedicel and equal in length to flagellum, scape and pedicel together 1.5 times longer than flagellum, basal flagellomere and apical flagellomeres subequal in length, basal flagellomere with thumblike dorsal spine extending  $\frac{3}{4}$  length of basal flagellomere, apical flagellomeres not hirsute, gradually tapered apically, terminal flagellomere sharply pointed. Maxillary palpus subshining dark brown, apical palpomere greatly inflated basally, strongly narrowed distally and sharply pointed apically, bearing short dark hairs. Labellum of proboscis partially sclerotized. Beard sparsely black haired.

*Thorax*: Mesoscutum black medianly, blackish brown laterally, bearing very short recumbent black hairs and pale yellowish white hairs posterolaterally anterior to scutellum. Scutellum black medianly, brown laterally, with tuft of white hairs on lateral margins. Pleuron blackish above, with dark grayish bloom below, bearing short black and yellowish hairs and small tuft of white hairs on posterodorsal surface of mesane-



Figs. 5-11. *Acanthocera (Polistinima) vespiformis*. 5, Adult female, habitus. 6, Adult female, lateral view of head. 7, Mature larva, lateral view. 8, Mature larva, lateral view of anal segment. 9, Pupa, lateral view. 10, Pupal aster, lateral view. 11, Frontal plate of pupa.

pisternum anterior to wing base. *Legs:* Coxae and femora blackish, except femora narrowly brown at extreme apices, coxae and fore and mid femora bearing golden hairs, hind femur black haired, fore and mid tibiae blackish brown and golden haired, hind tibia black and black haired, concolorous with hind femur, tarsi brown, golden haired. *Wing:* Anterior third strongly yellowish brown tinted, tinting fading out toward wing apex beyond fork of veins  $R_4$  and  $R_5$ , and faint yellowish tint along vein Cu in cell bm, vein  $R_4$  without spur.

*Abdomen:* Segments 1–2 strongly compressed laterally, abdomen strongly arched dorsally, tergite 1 brown anteriorly, black laterally and posteriorly, tergite 2 black, with 2 brown patches sublaterally in middle of segment, tergites 1–2 with patch of silvery hairs posterolaterally, remaining tergites black and black haired, sternite 2 irregularly brown and black, with complete transverse band of silvery hairs on posterior margin, remaining sternites black and black haired.

*Length:* 19.2 mm, wing, 16 mm.

Mature larva.—Length 26–28 mm, body creamy white to yellowish white. Head capsule 5.2 mm long, 1.2 mm wide. Respiratory siphon 0.8 mm long, width and length subequal. Anal segment length and width subequal. Body fully striated, cuticular striations most conspicuous on thoracic segments, very indistinct on abdominal segments, especially posteriorly, striations very narrowly spaced. Pseudopodia, if present, inapparent. Anterior third of thoracic segments ornamented with extremely small, dense microspines. Anterior margins of abdominal I–VII with row of elongate, curved microspines entirely encircling each segment, posterior margin of segment VII and anterior margin of anal segment broadly encircled by dense, minute microspines.

*Pupa.*—Length 18.4–20.8 mm. Color uniformly light brown. Frontal plate with numerous transverse dark cuticular striations anteriorly and laterally. Antennal ridges very narrowly divided medianly into 2

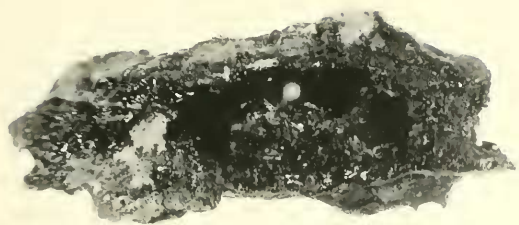
strongly projecting, shelflike extensions anteriorly, raised about 0.4 mm above surface of frontal plate, strongly rugose. Anterior and posterior orbital setae very short, borne on very small, irregular tubercles. Frontal tubercle absent. Callus tubercles very low and irregular, anterior and posterior margins sinuous, each bearing a single short seta. Antennal sheaths large and conspicuous, extended well beyond cephalothoracic suture, length about 1.4 mm. Thoracic spiracles strongly recurved, earlike. Anterior mesonotal tubercle bearing 2 setae each. Abdominal spinous fringes biseriate dorsally and laterally, uniseriate ventrally, anterior row very short, posterior row mostly short and stout, with scattered longer, more slender spines intermixed, and mostly long, slender spines mid ventrally. Dorsal preanal combs reduced to 3–4 spines borne on very large sublateral lobes and a single short spine on a median lobe. Ventral preanal comb with 5 short, stout spines on each side (♀). Terminal aster with dorsal arms reduced to minute spines, lateral and ventral arms very stout, lateral arms longest, projecting posteriorly, ventral arms about half length of lateral arms, projecting posteroventrally.

*Holotype.*—Female, COSTA RICA: Puntarenas Province, Península de Osa, Parque Nacional Corcovado, near Cerro Rincón, 700 m., coll. Alejandro Azofeifa Azofeifa, Jan. 1997.

*Paratypes.*—3 ♀, same data as holotype, except coll. Jan. 1998. All specimens reared from larvae and pupae. Holotype ♀ and 2 ♀ paratypes to be deposited in the Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Heredia, Costa Rica; 1 ♀ paratype in the University of New Hampshire Insect Collection (UNHC).

*Etymology.*—This remarkable species is named for its striking wasplike appearance.

*Discussion.*—The paratype females are very similar to the holotype, except 15.2 mm–15.4 mm. This striking wasp mimic was originally considered to belong to a new subgenus of *Acanthocera*, but the elon-



12



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Figs. 12–13. Larval habitat of *Acanthocera* (*Polistimima*) *vespiformis*. 12, Sap run from Cedro María tree (*Calophyllum brasiliense*) showing central cavity. 13, Pupal exuvia of *A. vespiformis* protruding from a sap run.

gate scape combined with the relatively short flagellum with apical flagellomeres not greatly lengthed suggests that this species should be placed in the subgenus *Polistimima*, erected by Fairchild (1969) for *Acanthocera* (*Polistimima*) *polistiformis* Fairchild, 1961, from Amapá, Brasil. *Acanthocera* (*Polistimima*) *vespiformis* differs from that species in color of the body, legs and wings, the much longer antennal scape and the basal flagellomere with a long thumblike dorsal spine. Unfortunately, the species from Brasil is known only from a single male. Thus, it is uncertain whether some of the differences of *A. vespiformis* may be due to sexual differences.

Larvae and pupae of *A. vespiformis* were found inhabiting tunnels in sap runs (Figs. 12–13) associated with beetle attacks to Cedro María trees (*Calophyllum brasiliense* Cambess) (Clusiaceae). When the larvae are in the sap tunnels, they transform the

sap into a sticky, foul-smelling mass that attracts flies and wasps that become trapped in the sticky sap. The larvae prey on the trapped insects. The larvae always were found only in sap tunnels less than two meters from the ground. Prior to adult emergence, the pupa moves partially out of the tunnel (Fig. 13). Emergence occurs during the day. Developing larvae have been observed throughout the year (Zumbado, personal communication). Length of the life cycle is unknown. In addition to the adults listed above, one deformed, shrivelled adult female did not harden properly, and is not included in the series of paratypes. This is the first species of the genus *Acanthocera* for which larvae and pupae have been found and reared, so it is not known if other species of *Acanthocera* live in similar habitats. This also is the first record for the genus *Acanthocera* in Central America., hitherto known only in South America, as far north as Colombia.

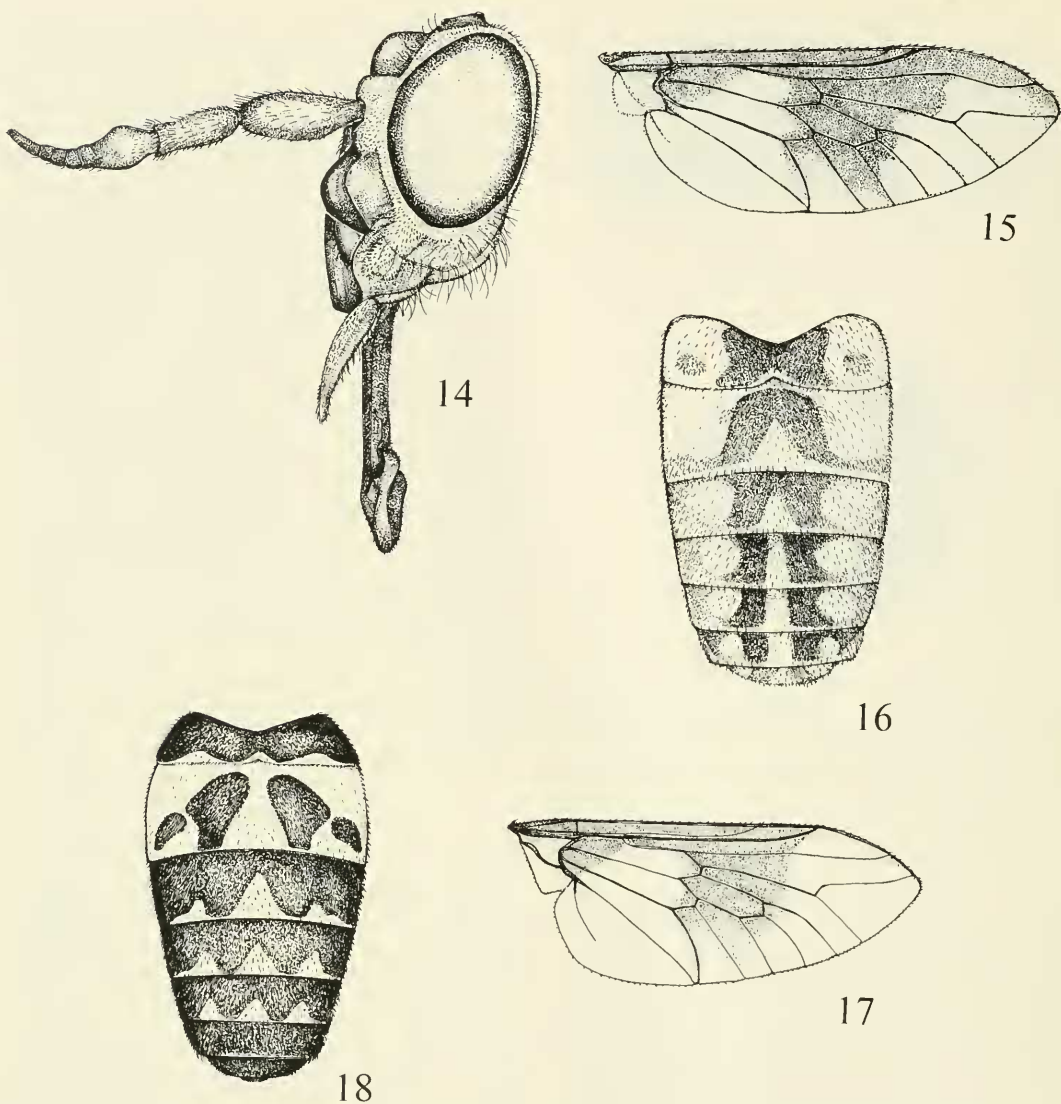
*Chrysops alajuelensis* Burger,  
new species  
(Figs. 14–16)

Diagnosis.—A yellowish gray and brown species with strongly inflated antennal scapes, blackish gray thorax, reddish to yellowish brown scutellum, wing crossband with irregular outer margin, abdominal tergites with pale yellowish gray median triangles and sublateral spots, leaving a darker bivittate submedian marking and sternites uniformly yellowish brown or faintly spotted.

Female.—*Head*: Front yellowish gray tomentose with a dark subshiny area surrounding ocelli. Frontal callus crescent shaped, narrowed laterally, reddish brown with darker markings laterally on the upper margin. Frontoclypeus reddish brown with narrow yellowish gray tomentose stripe. Antenna with scape, pedicel and base of flagellum brown, remainder of flagellum black, scape and pedicel distinctly inflated. Maxillary palpus light brown.

*Thorax*: Mesoscutum blackish gray with





Figs. 14–18. Adult females of *Chrysops alajuelensis* and *Chrysops costaricensis*. 14, *C. alajuelensis*, lateral view of head. 15, *C. alajuelensis*, wing. 16, *C. alajuelensis*, abdomen, dorsal view. 17, *C. costaricensis*, wing. 18, *C. costaricensis*, abdomen, dorsal view.

broad, indistinct submedian grayish longitudinal stripes and lateral margins. Scutellum reddish brown. Pleuron yellowish gray tomentose and yellowish white pilose. *Legs*: Femora reddish brown except extreme apices darker, tibiae and tarsi light brown. *Wing*: Dark pattern distinct, cells br and bm  $\frac{1}{5}$  and  $\frac{1}{3}$  infuscated basally, respectively, crossband broad, outer margin irregular, with an extension toward fork of veins

R<sub>4</sub> and R<sub>5</sub> along vein R<sub>4+5</sub> and in cell m<sub>1</sub>, cell cua<sub>1</sub> with apical half hyaline, apical spot drop-shaped.

*Abdomen*: Tergite 1 with a dark submedian marking adjacent to scutellum and pale sublateral spots, tergites 2–6 with pale median triangles and sublateral spots leaving a darker bivittate submedian area. Sternites uniformly yellowish brown and pale whitish pilose.

*Length:* 9.2 mm, wing, 7.6 mm.

*Male.*—*Head:* Eyes holoptic, narrowly contiguous at mid-height, upper eye facets distinctly larger than lower facets. Ocellar tubercle subshiny blackish, with long blackish hairs. Frontoclypeus shiny light brown with very narrow yellowish gray tomentose midstripe. Antennal scape and pedicel blackish brown, flagellum black except at extreme base. Maxillary palpus dark brown, apical palpomere short and slender, blunt apically.

*Thorax:* Mesoscutum and scutellum subshiny blackish, pale stripes on mesoscutum evanescent. Pleuron concolorous with mesoscutum, black pilose. *Legs:* Similar to female. *Wing:* Pattern similar to female except cells br and bm  $\frac{3}{4}$  infuscated basally.

*Abdomen:* Black, tergites 2–5 with broad yellow sublateral spots and lateral margins of tergites 1–4 yellowish to yellowish brown. Sternites 1–5 yellowish, with broad median longitudinal black stripe and narrower stripes sublaterally, sternites 6–7 black.

*Length:* 7.2 mm, wing, 6.4 mm.

*Holotype.*—Female, COSTA RICA: Guanacaste Province, 12 mi. SW of Cañas, II-27-1964, 25 ft., H. E. Evans (FSCA).

*Paratypes.*—COSTA RICA: San José Province: 3 ♂, 1 ♀, San Antonio-Desamparados, 16–18 June 1964, C. O. Berg (2 ♂, 1 ♀ CUIIC, 1 ♂ FSCA); Alajuela Province: 1 ♀, San Josecito de Alajuela, 2 km. from road to Atenas, near. Río Itiquis, 6 July 1969, Karl Valley, taken sweeping (CUIIC); Guanacaste Province: 1 ♀, same data as holotype ♀ (FSCA); 2 ♀, Estación Pitilla, 9 km. S. Santa Cecilia, GNP Biodiversity Survey, 85°25'40"W, 10°59'26"N, Jan. 1989 (INBIOCRI001047591) and Feb. 1989 (INBIOCRI000105975) (INBio).

*Etymology.*—Named for Alajuela Province in Costa Rica.

*Discussion.*—The five paratype females are 8.4–8.8 mm long. All the males are 7.2 mm long. The female paratypes are very similar to the holotype, except the posterior extensions of the crossband do not reach the

hind margin of the wing. Two of the male paratypes have very faint, small dark grayish median posterior triangles on tergites 2–4.

*Chrysops alajuelensis* is closely related to *Chrysops scalaratus* Bellardi, known from Mexico to western Panama, and was initially confused with that species. Females of *C. alajuelensis* differ from those of *C. scalaratus*, as follows: frontal callus relatively slender and reddish brown, antennal scapes distinctly stouter, frontoclypeus with distinct midfacial tomentose stripe, mesoscutum yellowish gray with very indistinct paler stripes, scutellum reddish brown, ground color of abdominal tergites yellowish brown, sublateral spots relatively small, sternites unicolorous yellow brown or with very faint longitudinal stripes. *C. scalaratus* has the frontal callus broader and mostly black, antennal scape only slightly inflated, frontoclypeus bare and shiny, rarely with a short tomentose spur beneath antennae, mesoscutum shiny black with distinct gray longitudinal stripes, scutellum black, abdominal tergites with ground color blackish and sublateral pale spots very large, sternum with distinct median black stripe. Males of *C. alajuelensis* differ from those of *C. scalaratus* as follows: antenna shorter and scape much stouter, mesoscutum with paler stripes evanescent or absent, abdominal tergites with broad black midstripe and large sublateral yellowish brown spots, sternites bearing broad median and narrow sublateral black stripes. *Chrysops scalaratus* males have the antenna distinctly longer and scape less inflated, mesoscutum with distinct longitudinal gray stripes, abdominal midstripe narrow, with distinct median grayish triangles on tergites 2–5 and narrow sublateral dark stripes on tergites 2–6, sternites without distinct sublateral black stripes.

***Chrysops costaricensis* Burger,  
new species  
(Figs. 17–18)**

*Diagnosis.*—A yellow and black species with blackish thorax, conspicuously yellow

spotted pleuron, wholly black femora, narrow apicocostal infuscation on the wing, and black abdomen with distinct rows of median and dorsolateral triangles.

**Female.**—*Head*: Front yellowish gray tomentose with a large shiny black area surrounding ocelli. Frontal callus crescent shaped, broadest in middle, strongly narrowed near eye margins, brown with black upper margin. Frontoclypeus shining brown, gena strongly inflated. Antennal scape light brown, relatively slender, pedicel darker brown to blackish at apex, flagellum black. Maxillary palpus dark reddish brown.

*Thorax*: Mesoscutum and scutellum shining black, mesoscutum with two broad yellowish submedian longitudinal stripes anteriorly that fade out about half way to the scutellum, and lateral margins narrowly yellowish. Pleuron shining black, proepisternum, proepimeron, upper area of mesanepisternum, mesanepimeron and meron strongly yellow spotted and pale haired. *Legs*: Femora wholly black, fore and hind tibiae black, mid tibia brown, all basal tarsomeres brown, apical tarsomeres brown basally, black apically. *Wing*: Wing with distinct dark brown pattern and broad crossband, cells br and bm  $\frac{2}{5}$  and  $\frac{1}{5}$  infuscated basally, respectively, apices also infuscated, crossband with slightly irregular outer margin, divided posteriorly by hyaline area in cell cua<sub>1</sub> that does not encroach on cell m<sub>3</sub>, apicocostal infuscation narrow, filling half of cell r<sub>1</sub> and slightly widened in cell r<sub>4</sub>, extending to wing apex.

*Abdomen*: Tergite 1 with narrow, irregular posterior and lateral margins yellow, tergite 2 yellow with pair of large, black submedian markings narrowly joined to smaller dorsolateral black spots, producing paired geminate markings, middorsal yellow triangle large, extending to anterior margin, tergites 3–5 black with middorsal row and dorsolateral rows of distinct yellow triangles arising from hind margins, tergites 6–7 black. Sternites broadly black medianly and laterally, leaving narrow ventrolateral

yellowish brown patches, and hind margins narrowly yellowish.

*Length*: 7.3 mm, wing, 6.6 mm.

**Male.**—(Headless). Thorax and abdomen similar to female, but more extensively black. Submedian pale stripes on mesoscutum evanescent. Pleuron almost entirely black except for small gray tomentose spots on proepisternum, mesanepisternum and meron. Wing with cells br and bm entirely infuscated except for small subapical hyaline spots, and infuscation broadly invading cell a<sub>1</sub>. Abdominal tergite 2 more extensively black, median yellow triangle small, equilateral, not extending to anterior margin.

**Holotype.**—Female, COSTA RICA: Provincia Heredia, Estación Magsasay, Parque Nacional Braulio Carrillo, 200 m., January, 1991, coll. A. Fernandez (INBIOCRI000627622) (INBio).

**Paratypes.**—COSTA RICA: 1 ♀, Heredia Province: Estación El Ceibo, Parque Nacional Braulio Carrillo, 400–600 m., March 1990, coll. C. Chaves (INBIOCRI000167501) (INBio); ♀, same data, except January 1990 (INBIOCRI000201892) (INBio). Puntarenas Province: ♀, Rancho Quemado, Península de Osa, 200 m., November 1991, coll. F. Quesada (INBICRI000462501) (UNHC); ♀, same data, except December 1992 (INBIOCRI000905966) (INBio); ♂, same data except December 1991 (INBIOCRI000342968) (INBio). San José Province: ♀, F. Cementario de la Máquina, Parque Nacional Chirripó, 2,100–2,500 m., 2 March 1993, coll. M. Zumbado (INBIOCRI001305778) (INBio).

**Discussion.**—The paratype females are 6.6–7.3 mm long. The black markings on tergite 2 are narrowly or broadly confluent, producing paired geminate dark markings, and the ventrolateral yellowish-brown markings on sternites 3–5 are absent.

*Chrysops costaricensis* appears to be closest to *Chrysops chiriquensis* Fairchild, 1939, known from Mexico (Chiapas) to Colombia, but differs in the following characteristics: females are somewhat smaller than *C. chiriquensis* females; frontal callus

reddish brown with black upper margin, frontoclypeus bare and shiny, pleuron strongly yellow spotted, femora black, wing with apical infuscation narrow, joined to crossband, median yellow triangle on tergite 2 open to anterior margin. Females of *C. chiriquensis* have the frontal callus largely black, frontoclypeus with tomentose midstripe, mesoscutum without yellowish lateral stripe, pleuron dull grayish spotted, femora brownish with black apices, apical infuscation drop shaped, separated from crossband, median triangle on tergite 2 not open to anterior margin. The male of *C. costaricensis* has femora black, wing with apical infuscation joined to crossband, and tergites 2-5 with median and sublateral yellow triangles arising from posterior margin. Males of *C. chiriquensis* have reddish brown femora, apical infuscation separated from crossband and tergites 2-4 with yellow sublateral stripes.

KEY TO THE SPECIES OF *CHRYSOPS*  
OCCURRING IN COSTA RICA

An asterisk (\*) indicates not yet recorded from Costa Rica, but possibly may occur there.

- 1. Frontoclypeus with a median tomentose stripe . . . . . 2
  - Frontoclypeus entirely bare and shiny (rarely with a short tomentose spur) . . . . . 3
- 2. Mesoscutum and scutellum shiny black. Apical infuscation of wing separated from crossband. Abdominal tergites black with pale yellowish markings, tergite 1 entirely black except for extreme apex, tergites 3-5 with median and sublateral yellowish triangles arising from hind margins. Sternum black with yellowish gray sublateral stripes . . . . . *chiriquensis* Fairchild
  - Mesoscutum grayish brown tomentose. Scutellum yellowish brown. Apical infuscation of wing joined to crossband. Abdominal tergites mostly yellowish brown with yellowish brown median triangles and rounded sublateral spots not arising from hind margins. Sternum uniformly yellowish brown to faintly striped medianly and sublaterally . . . . . *alajuelensis*, n. sp.
- 3. Discal cell of wing largely hyaline, at least a central spot or hyaline streak . . . . . 4
  - Discal cell of wing wholly infuscated . . . . . 5
- 4. Abdomen largely yellow, with two dorsolateral

- dark stripes from the second to third tergites, generally divided into two stripes on third and succeeding segments. Legs and frontal and facial callosities largely yellow. Thorax yellow to brown, with yellow tomentose stripes. Wing pattern yellowish brown . . . *variegatus* (DeGeer)
- Abdomen with prominent gray tomentose transverse bands on posterior margins of all tergites. Wing pattern of two dark bands crossing the wing at the ends of cells br and bm and beyond discal cell. Apical spot a faint, narrow infuscation along fore border. Apices of femora and at least bases of tibiae yellow . . . . . *aleni* Fairchild
- 5. Apical spot of wing a slender band or slightly widened, not extending beyond apex and encroaching into cell  $r_4$  only at extreme apex . . . 6
  - Apical spot of wing extensive, filling most of wing apex and leaving but a narrow and irregular hyaline crescent or series of spots between it and crossband . . . . . 12
- 6. Cell  $cua_1$  entirely infuscated. Cell  $m_3$  usually with a small hyaline spot. Crossband broad and intensely black. Thorax black, without dorsal stripes or lateral spots. Abdomen black, sides of the second tergite with small, dull yellow triangles, and with small, dull yellow median triangles on tergites 2-4 . . . . . *leucospilus* Wiedemann\*
  - Cell  $cua_1$  always with at least the apex hyaline, often over half hyaline. Cell  $m_3$  with or without a hyaline spot . . . . . 7
- 7. Mesoscutum and pleuron blackish, without stripes or spots. Wing with hyaline area in cell  $cua_1$  clearly extending into cell  $m_3$ , but not crossing it. Abdomen black with small dull yellow triangles laterally on tergite 2 and median yellow triangles on tergites 2-5 . . *melaeus* Hine
  - Mesoscutum strongly striped or at least weakly striped anteriorly, pleuron striped or spotted . . . 8
- 8. Abdomen with second tergite largely yellow except for two large, submedian black markings and small dorsolateral spots, yellow median triangle reaching anterior margin. Tergites 3-5 black with prominent median and dorsolateral yellow triangles arising from posterior margin. Sternites 1-4 with large median black patches . . . . . *costaricensis*, n. sp.
  - Abdomen without prominent yellow dorsolateral triangles on tergites 3-5 . . . . . 9
- 9. Abdomen with a dorsolateral series of pale dashes, forming a pair of interrupted stripes, as well as a row of pale median triangles on tergites 2-5. Sides of tergites 1-3 or 4 yellowish. Abdomen yellowish ventrally, with a broad, black median longitudinal stripe. Crossband of wing with outer border irregular, with extension toward fork of veins  $R_4$  and  $R_5$  along vein

- R<sub>4-5</sub>, fading posteriorly and failing to reach hind margin in cell m<sub>3</sub> . . . . . *scalaratus* Bellardi
- Abdomen without dorsolateral interrupted stripes or even ventral stripe. Outer margin of crossband straight or slightly concave, crossband filling apex of cell m<sub>3</sub> . . . . . 10
- 10. Second tergite black, broadly yellow at the sides, rarely with a small median yellow spot, generally without any median marks. Tergites 3-4 black, with equilateral yellow triangles whose apices may reach anterior borders, tergite 5 with a yellow hind border widened into a low triangle in middle. Wing with a narrower crossband, the hyaline area in posterior margin of crossband large, filling all but base of cell cua<sub>1</sub> and entirely crossing cell m<sub>3</sub> in the middle. Cell r<sub>3</sub> with a small hyaline streak at base . . . . . *aurouguttatus* Kröber
- Second tergite black with yellow median hourglass-shaped mark extending longitudinal width of tergite, sides broadly yellow. Third to fifth tergites black with yellow hind borders, widened into narrow median triangles which usually reach anterior border of segments. Wing with a broad, dark crossband, without a hyaline fenestra in cell r<sub>3</sub>, and with hyaline area in the posterior margin of the crossband confined to cell cua<sub>1</sub> . . . . . 11
- 11. Apical spot black, extending as a clearly defined narrow costal stripe of even width to wing apex . . . . . *varians* var. *tardus* Wiedemann
- Apical spot dilute, poorly defined, spread as a brownish shade over much of wing apex . . . . . *varians* *vargus* Fairchild
- 12. Hind femur at least one-third black basally . . . . . 13
- Hind femur red or yellow, at most extreme apex black . . . . . 14
- 13. Abdomen black, with the second segment anteriorly narrowly, laterally broadly yellow, and with a broad yellow median triangle which rarely extends through black to join anterior yellow band. Tergites 3-5 or 6 with narrow yellow hind borders, widened into median triangles of variable size on 3 and often 4. Pleuron usually with a spot of yellow pile, rarely lacking. Wing with crossband joined to a cloud on fork of veins R<sub>4</sub> and R<sub>5</sub> by a dark bridge above the vein, leaving a small hyaline spot between cloud and crossband on vein . . . . . *calogaster* Schiner
- Abdomen wholly black, or rarely with pattern of *calogaster* faintly indicated in grayish to-

- mentum. Pleuron always entirely black. Cloud on fork of veins R<sub>4</sub> and R<sub>5</sub> never joined by a complete bridge to crossband, rarely almost joined by spurs . . . . . *soror* Kröber
- 14. Cloud on fork of veins R<sub>4</sub> and R<sub>5</sub> joined to crossband by a broad spur of dark color. Mid tibia black or blackish, contrasting with pale femora. Abdomen with second tergite narrowly white to yellow anteriorly, widened to full length of segment at sides and with a broad, small median yellow triangle. Third and fourth tergites rarely with faint vestiges of small, pale median triangles . . . *nexosus* Fairchild
- Cloud on fork of veins R<sub>4</sub> and R<sub>5</sub> unconnected with crossband. Mid tibia at most slightly brownish, not strongly contrasting with pale femora. Abdomen as above, but pale triangle on second tergite usually taller and narrower, occasionally joined to anterior yellow by a narrow, median yellow stripe. Third tergite usually with a dull yellowish median streak, sometimes lacking, and fourth tergite rarely with a minute paler streak . . . *mexicanus* Kröber

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